



Ask the Climate Question:

Adapting to Climate Change in Urban Regions

Josh Foster

**Climate Adaptation Program Manager
Urban Leaders Adaptation Initiative**

**Planning for North Carolina's Future:
Ask the Climate Question**

**Raleigh, NC
March 3, 2010**



Center for Clean Air Policy

Dialogue. Insight. Solutions.

- Help governments develop, implement climate policy:
 - US States: California, Connecticut, Massachusetts, Maine
 - Countries: Europe, China, Mexico, Brazil
- Convene international climate negotiator dialogs
- US Climate Policy Initiative
- Transportation and Climate Policy Dialogue – Smart Growth
- Urban Leaders Adaptation Initiative:



“Ask the Climate Question”

Urban Leaders Adaptation Initiative

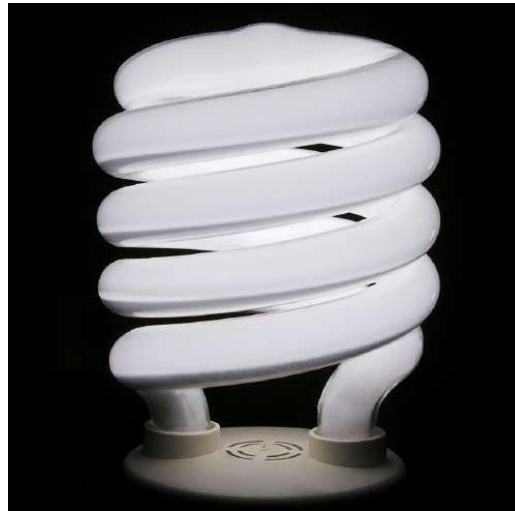
- Core funding from the **Rockefeller Foundation**
 - Part of \$70M worldwide on climate change resilience
- Inform & catalyze **local, state, & regional action** on adaptation - **10 local urban partners:**
 - **Chicago, King County, Los Angeles, Miami-Dade, Milwaukee, Nassau, New York City, Phoenix, San Francisco, Toronto**
- Develop and share **“best practices”** and success stories to aid and influence **other communities**
- Inform US **national and state policy needs**



ASK THE CLIMATE QUESTION: MAINSTREAMING ADAPTATION

- What we plan, fund, or build where and how:
 - land-use, development, transportation
- Daily decisions made by:
 - mayors, city managers, citizens & business
- All directly affects:
 - greenhouse gas (GHG) emissions, and
 - **resilience to climate change**
- How we mitigate and adapt is risk management:
 - **Science, models, scenarios, decision support tools**
 - Making people part of the solution
 - Spurs innovation at the local, state, & regional levels

The Face of Mitigation



The Face of Adaptation?



The Real Face of Adaptation



Adaptation: Extreme Heat Events



Chicago

Undertake Innovative Cooling Strategies



Source: J Coffee

What is Climate Adaptation?

- *“Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects” (IPCC AR4)*
- **Emerging & inevitable climate changes:**
 - Expected 3.6° F increase in global average temperature regardless of action to reduce emissions
 - Estimated: 6 - 7.5° F by 2050 without emissions reductions

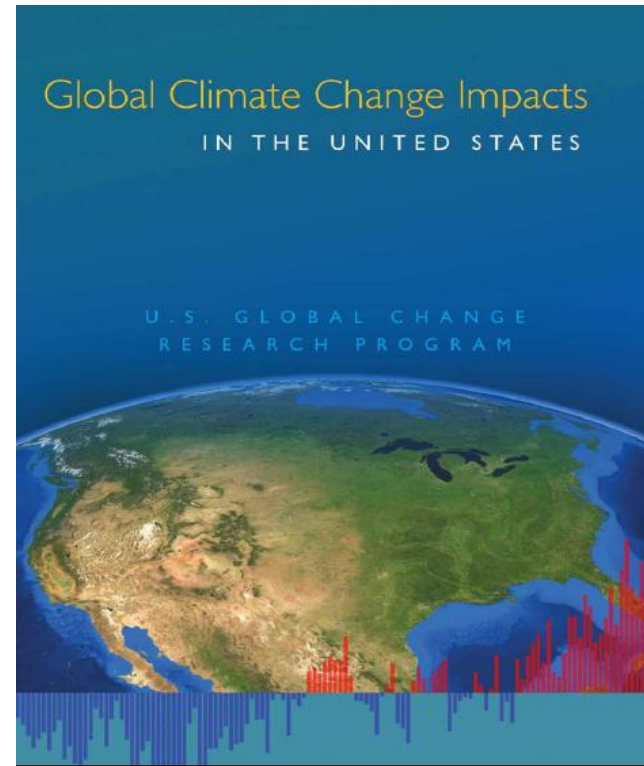
What is Climate Adaptation?

ADAPTATION:

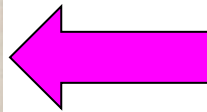
1. Preparedness: Risk & Hazard “Mitigation”
2. Passive Adaptation: Reacting to Climate Change
3. **Active Adaptation: Planning Ahead for Climate Change**
 - **Toward Resilience:** Ability to cope with or bounce back from climate impacts

To What Are We Adapting?

- Key Summary for Decision Makers: Regional Impacts of Climate Change and Weather Extremes in the United States
 - From US Global Change Research Program (USGCRP) & NOAA
2009

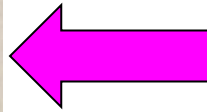


NATIONAL CLIMATE VULNERABILITIES



Number of Billion Dollar Weather & Climate Disasters 1980-2008

Dark Blue = 21-30 events per state



Concentrations of Black or African Americans Pop.

Dark Blue = 1 to 3.3 Million Pop. per state

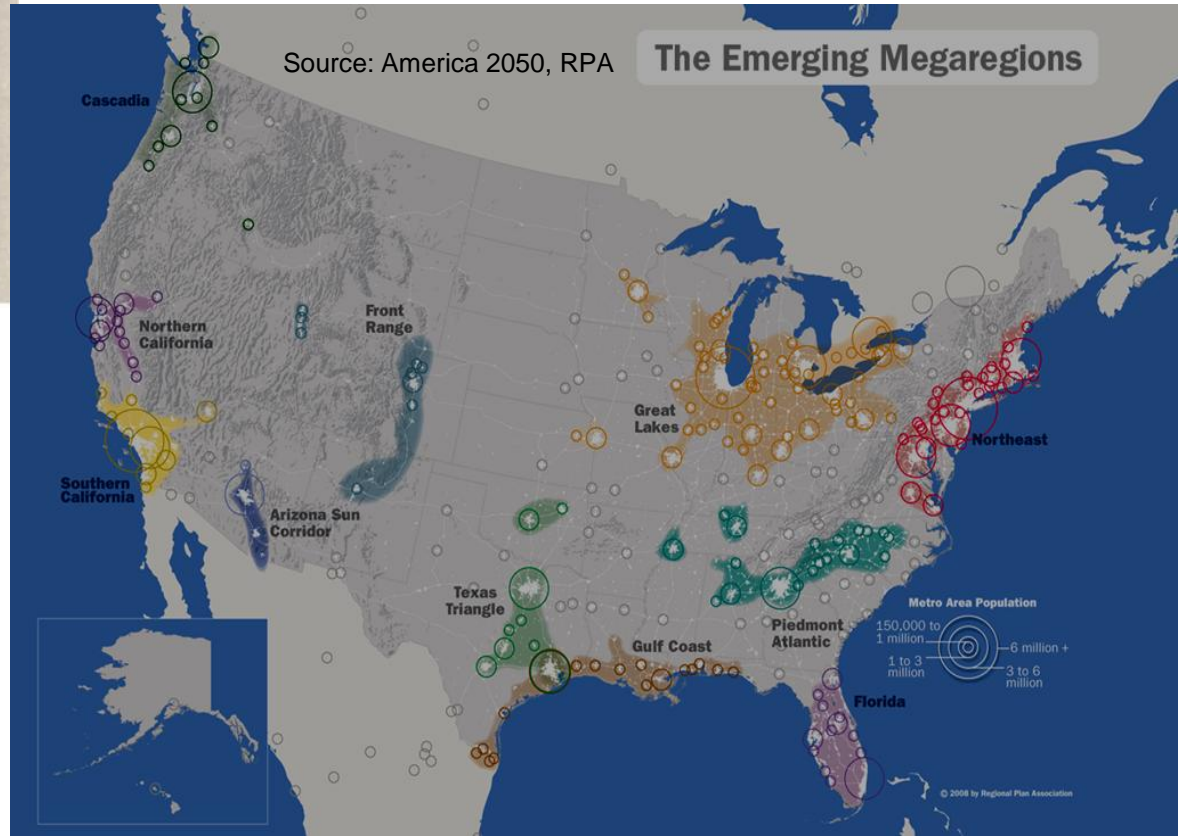


States in the Southeast have experienced more billion-dollar weather and climate disasters – from hurricanes and floods to droughts and heat waves – than other parts of the country. These disasters disproportionately impact the large population of African Americans who call the Southeast home.

Source: A. Staudt, NWF

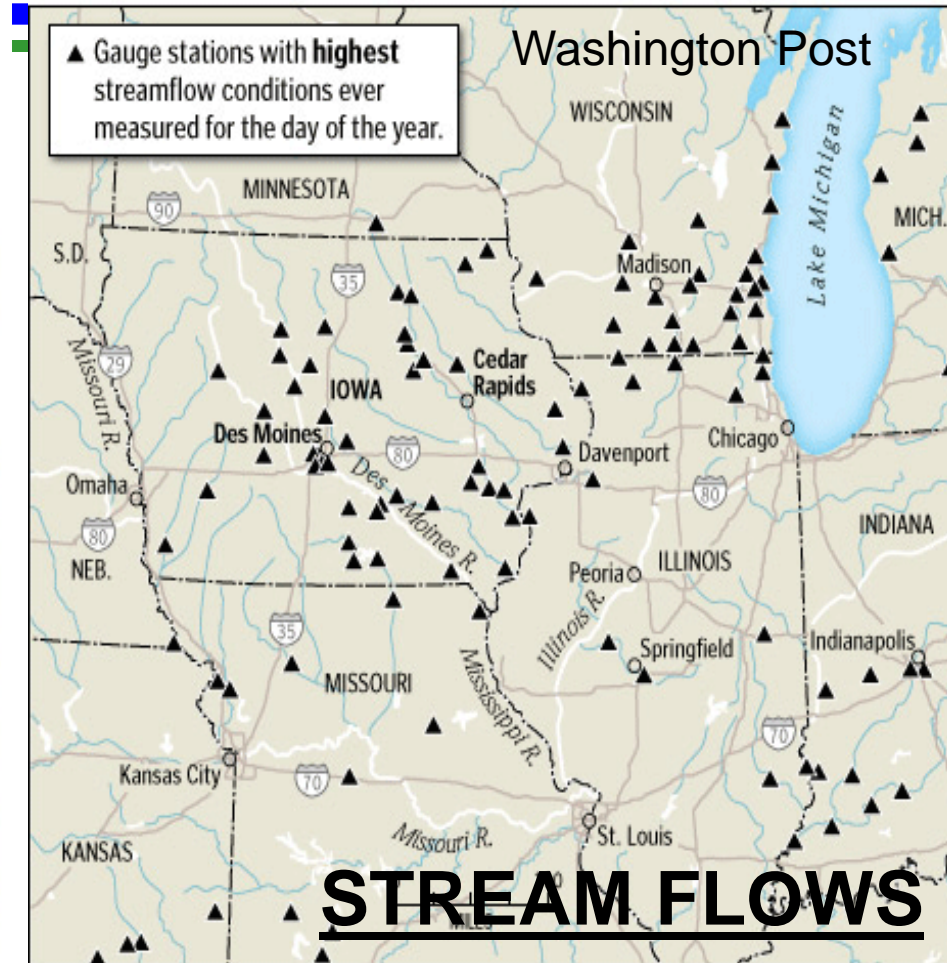
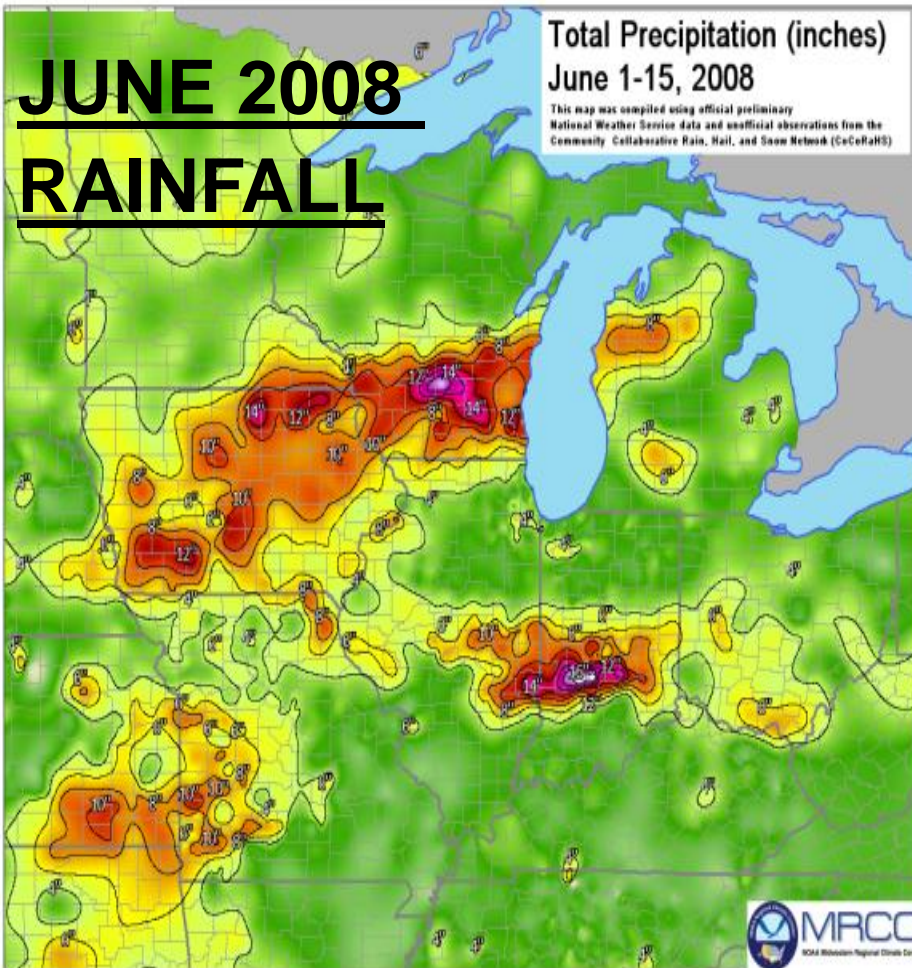
11 Emerging Urban Mega-Regions

Regional Population Concentrations in 2050



WEATHER AND CLIMATE RISKS ARE BEST MANAGED AT REGIONAL, STATE, & LOCAL SCALES

US MIDWEST 500 YEAR FLOODS 1993 & 2008 (2 in 15 yrs.)



ASK THE CLIMATE QUESTION – All Timescales

- **All Climate Time-Scales** – for *Response, Preparedness, Planning* (2 Weeks to 100 yrs)
- **Urban decision making:**
 - » *entry points for climate science, information & services:*
 - Emergency Management - **Daily to Weekly** – **Weather Extremes**
 - Public Works - **Seasonal to Yearly** – **Climate Variability**
 - Planning - **Yearly to DECADE to Century** – **Climate Change**

Water Capital Improvement Programs Needed in US over next 20 years

- Estimated investment by drinking water utilities needed to “deliver safe drinking water and protect public health,” 2003 – 2023¹:

- **\$277,000,000,000**

- Estimated “pollution control capital investment needs required (today) to meet environmental and human health objectives of the Clean Water Act”²:

- **\$203,000,000,000**

Source: D. Behar

- **Total *Near Term* Expected Water, Wastewater, & Stormwater Investment:**

- **\$480,000,000,000 without Climate Change**

- **\$1,000,000,000,000 (\$1 Trillion)**

WITH CLIMATE CHANGE!



1 “Drinking Water Infrastructure Needs Survey and Assessment: Third Report to Congress.” USEPA Office of Water, 2005.

2 “Clean Watersheds Needs Survey 2004: Report to Congress.” USEPA, January 2008 (from David Behar SFPUC)

Good News - We're Already Doing It!

Urban Leaders partners, and states, & regions already have many of the skills needed for climate risk management through their experience in:

- Hazard Mitigation
- Emergency Response
- Flood Management for Extreme Precipitation
- Coastal Management
- Water Conservation
- Water Supply Planning for Droughts
- Green infrastructure – Green Roofs, Urban Forestry
- Smart Growth Land Use Policies



BUT LEADERSHIP IS NEEDED!

Ask the Climate Question:

Adapting to Climate Change Impacts in Urban Regions

A Report by the Center For Clean Air Policy
Urban Leaders Adaptation Initiative

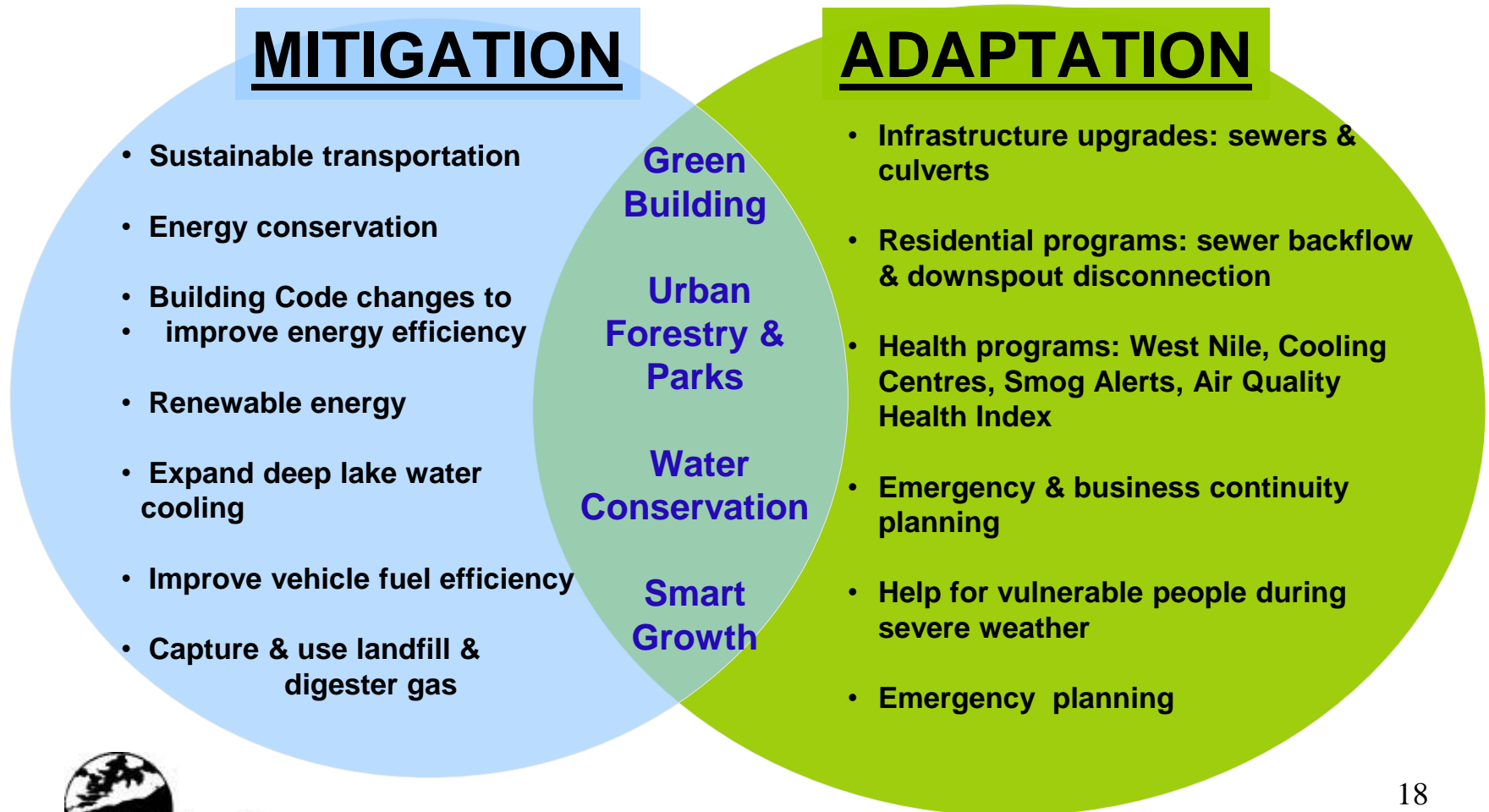


Ashley Lowe
Josh Foster
Steve Winkelman

www.ccap.org/ul-july09hillbriefing.php June 2009

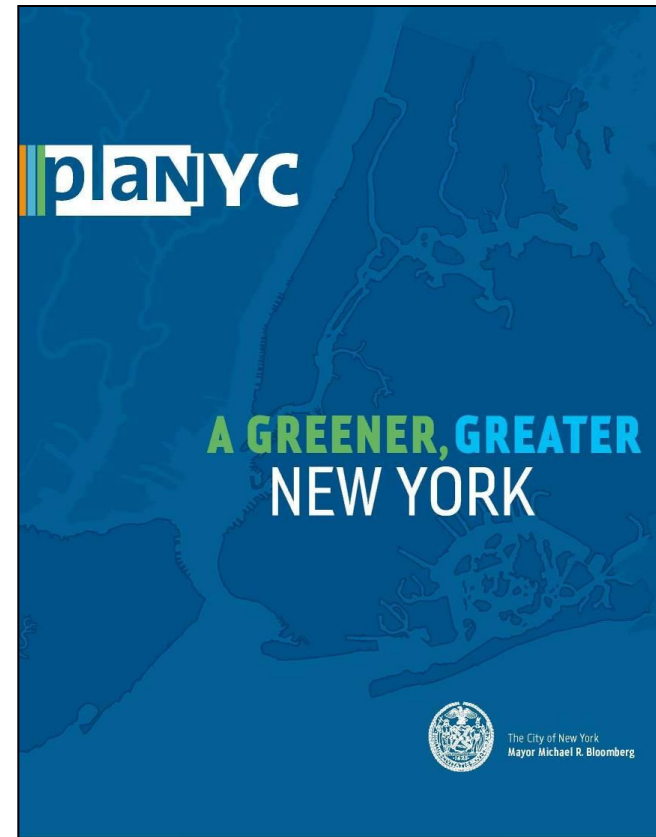
Mitigation – Adaptation CoBenefits

Avoiding the unmanageable, managing the unavoidable



New York City Sustainability Framing for Adaptation

- Create enough housing for a growing population
- Ensure all New Yorkers have parks within a 10-minute walk
- Develop water network back-up systems (including stormwater)
- Open 90% of waterways and protect natural areas



\$20B in Water Infrastructure over next 10 years!

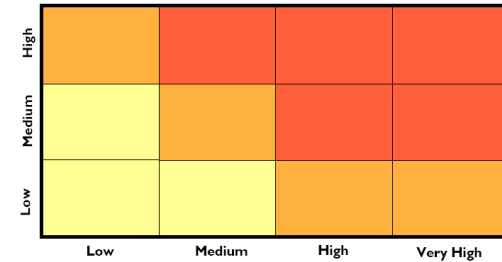
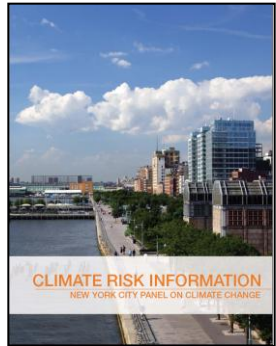
NYC Adaptation Task Force Adaptation Plan in Spring 2010

NYC-specific climate
change projections

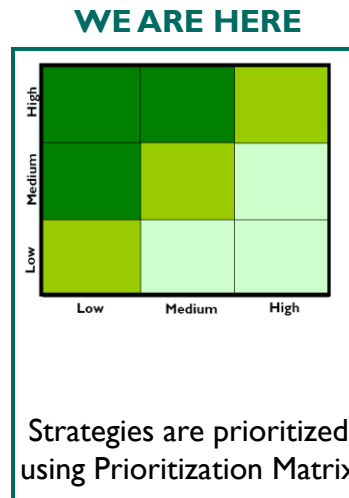
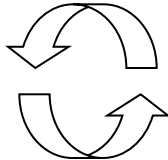
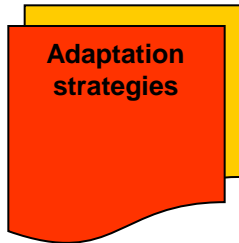
Stakeholder's use
projections to identify
vulnerabilities

Inventories normalized by sector
through the working groups and
policies and regulations identified
for Policy Working Group review

Stakeholder vulnerabilities are
prioritized using Risk Matrix



PROJECTIONS



Adaptation strategies
are developed for high
priority risks

Strategies are
coordinated among Task
Force members

Adaptation plans are developed,
including recommendations for
policy and regulatory changes

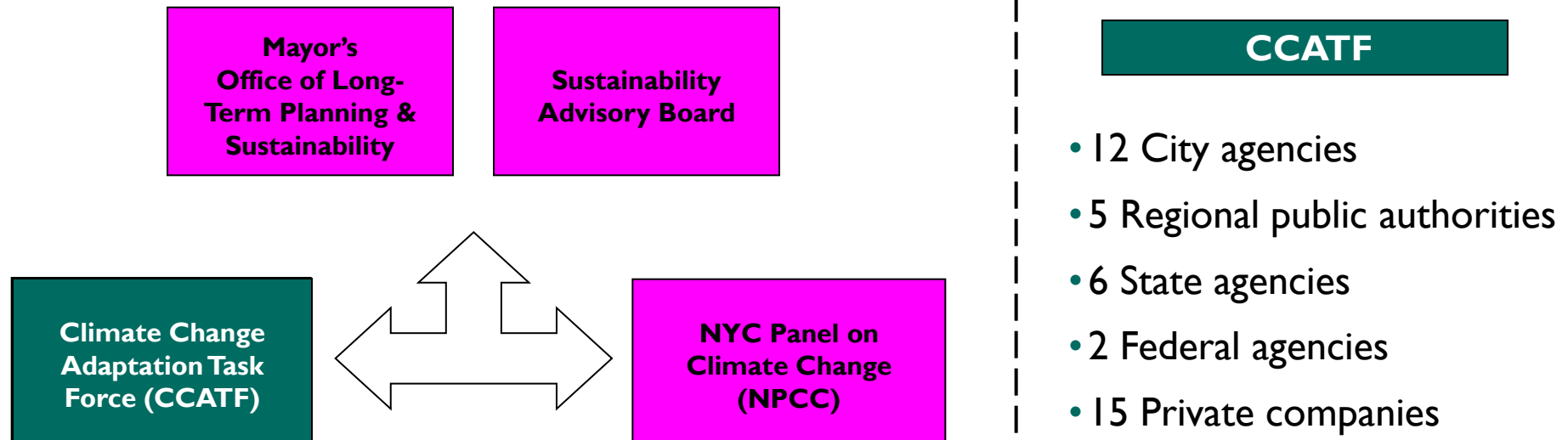


New York City

Source: A. Freed

2

Identify the Impact of Climate Change on the City and Develop Strategies to Mitigate these Risks



New York City

Source: A. Freed 21

The Adaptation Task Force is the first effort of its kind to include representatives from the local, state, and federal government and the private sector

City Agencies

- Dept. of Buildings
- Dept. of City Planning
- Dept. of Design & Construction
- Dept. of Environmental Protection
- Dept. of Health
- Dept. of Law
- Dept. of Parks & Recreation
- Dept. of Sanitation
- Dept. of Transportation
- Economic Development Corp.
- Office of Emergency Management
- Office of Management & Budget



State Agencies/Authorities

- Dept. of Environmental Conservation
- Dept. of State
- Dept. of Transportation
- Governors Island Preservation and Education Corporation
- Hudson River Park Trust
- Metropolitan Transportation Authority
- NY Power Authority
- NYS Public Service Commission
- NJ Transit
- Port Authority of NY/NJ
- State Emergency Management Office

Federal Agencies

- Amtrak
- National Park Service

Private Companies

- Astoria Energy LLC
- AT&T
- Cablevision
- Con Edison
- CSX
- National Grid
- NRG Energy
- NY Independent System Operators
- Sprint Nextel
- Suez Energy, NA
- Time Warner Cable
- T-Mobile
- TransCanada
- USPowerGen
- Verizon

New York City

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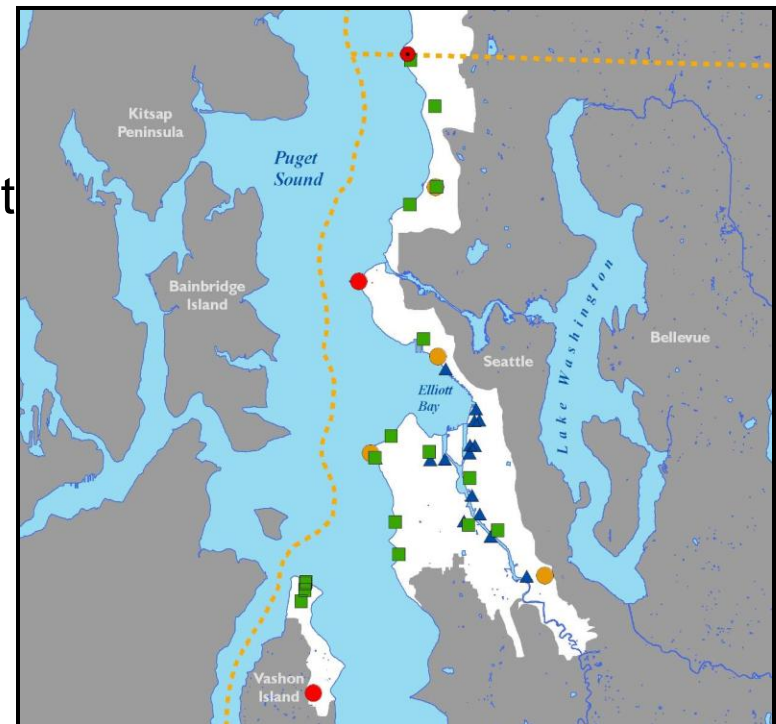
Source: A. Freed

King County - Vulnerability of Wastewater Facilities to Flooding from Sea-Level Rise

- With University of Washington:
Develop and conduct GIS based methodology combining sea level rise projections + storm surge, compared to facility elevations
- Recommendations include:
 - » Raise elevation of Brightwater sampling facility and flow monitor vault sites.
 - » Raise weir height and install outfall flap gate for Barton Pump Station improvements.
 - » Conduct terrain analysis of five lowest sites and West Point Treatment Plant.



Source: M. Kuharic



King County Flood Planning and Control

- Up to \$335 million to improve King County's system of 500 levees
- Program does roughly 10X the work it used to do
- Increase river capacity, purchase the most susceptible lands



Source:
M. Kuharic

King County Transportation Infrastructure

- New \$24 million **Tolt Bridge** spanning the Snoqualmie River has been **built with longer spans** than the previous bridge, increasing its capacity to withstand high flows and major flooding events
- More than **57 smaller "short span" bridges** are **planned to be replaced with wider span structures**, allowing debris and floodwater to pass underneath without backing up river levels
 - **Culverts** that will increasingly be at risk of chronic flooding and road failure, and would cause destruction of fish habitat during storm events – **will be replaced with larger systems not only to prevent roads from failing, but also to improve fish passage**

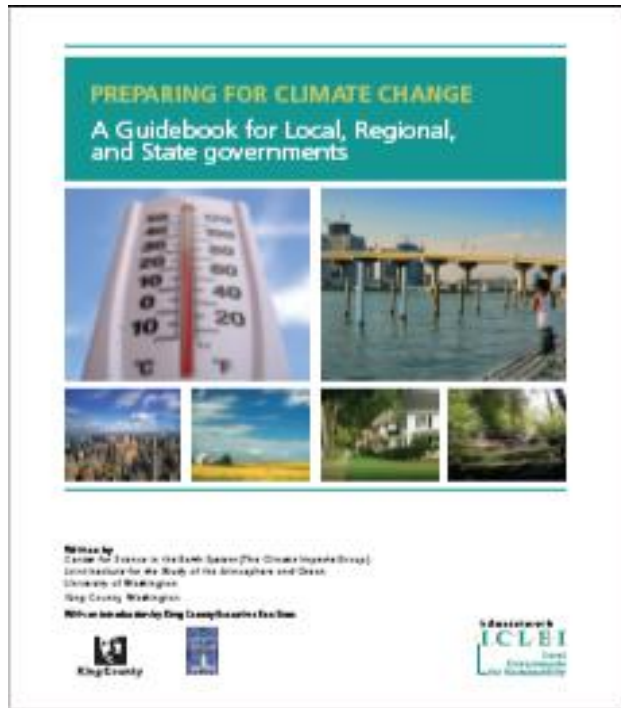


Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments ces.washington.edu/cig/fpt/guidebook.shtml

by King County (Washington), University of Washington, ICLEI, NOAA

University of Washington & King County:

- 1: Initiate your climate resiliency effort
- 2: Conduct a climate resiliency study
- 3: Set preparedness goals and develop your preparedness plan
- 4: Implement your preparedness plan
- 5: Measure your progress and update your plan



Guide for Action

Lessons Learned: Creating the Chicago Climate Action Plan

- Process Evaluation for Adaptation Planning
- Context & Timeline:
 - Scientific Assessment
 - Local Govt. Actors
 - External Stakeholders
 - Funding: who & how



Lessons Learned:
Creating the Chicago Climate Action Plan

Julia Parzen • July 2009

www.chicagoclimateaction.org

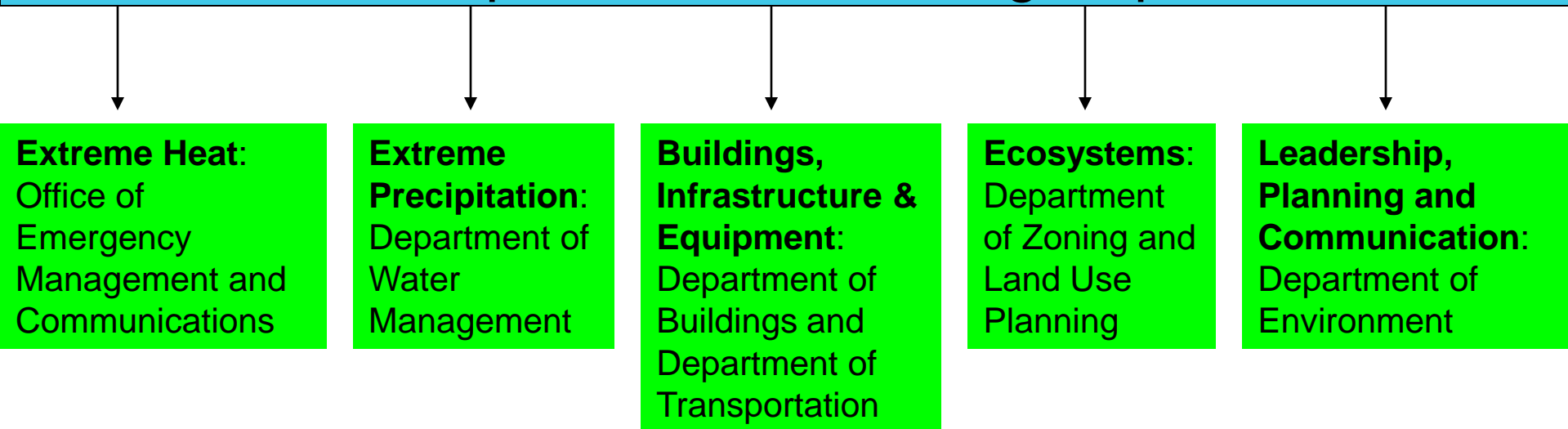


Adaptation Work Groups

Chicago Climate Change Task Force

Chicago Mayor's Office

Work Groups and their Leading Department



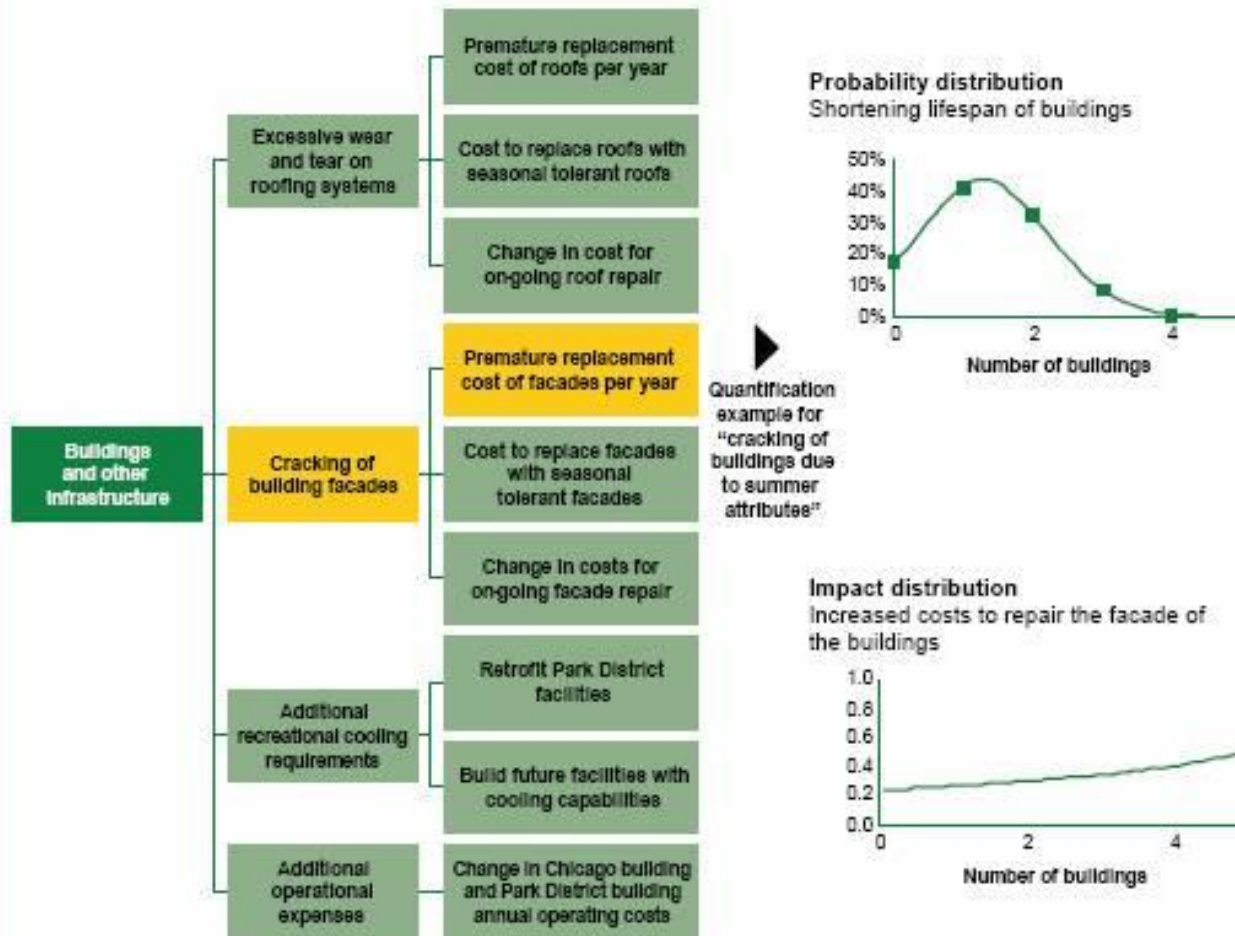
125 Potential Adaptation Actions

Organized by Risk, Timing and Department

Impact	Risk	Timing **	Construction, Buildings & Property	Tourism	Environment	Fire	Fleet Management	Housing	Human Services	Emergency Management	Police	Public Health	Streets and Sanitation	Transportation	Water Management	Parks and Open Space	Storm Water Management
Need to get greater penetration of A/C to residential units (particularly high risk areas)	Moderate	Near	x					x				x					
Damage to property and increasing cost of insurance due to stormwater	Moderate	Mid	x			x			x			x	x		x		x
Higher costs associated with managing invasive species	Moderate	Mid			x										x	x	
Increased potential for shoreline erosion/storm damage	Moderate	Mid			x						x					x	
Possibility of higher frequency/severity of storms	Moderate	Mid				x				x	x		x			x	

CHICAGO Economic Risk Analysis via Scenarios

Impact and probability distributions were established for scenarios affecting City operations and assets



NYCMQWCF1MKT-043

POLICY LEVERS FOR CHANGE – ADAPTATION IN PRACTICE

Issues	Transport	Land Use	Hazard Mitigation	Water	Info & Tools
LOCAL	MPO Transportation Plans		Green roofs	Treatment plants	Public education
	Zoning, housing programs		Coastal buffers	Flood mgmt plans	
STATE	Transp & infrastructure \$			FEMA Hazard Mitigation Grants	Clean Water State Revolving Loan Fund
FED	SAFETEA-LU reauthorization		Water Resource Dvpt Act		
					Flood maps
PRIVATE	Development decisions (location, design) Long range energy and water planning				Insurance models

RICH CONTEXT – Who Decides & Who Pays?: convergence of authority, power/politics, legitimacy, legal jurisdiction, regional scale, scientific information, financial resources^{31..}

Governance & Law

Policy Levers for Adaptation

Federal/State Framework (examples)

- » Infrastructure Siting
- » Zoning/Private Development
- » Non-infrastructure Public Development
- » State Coastal Acts
- » Coastal Zone Management Act (CZMA)
- » California AB 32
- » California SB 375 (linking development to GHG emissions)
- » CEQA
- » Property Law

Constitutional and Common Law (examples)

- » Public Trust Doctrine
- » Nuisance
- » Prescription
- » 5th Amendment Takings

Market Incentives (examples)

- » •Private Insurance
- » •Government as Reinsurer & Insurer of Last Resort (NFIP)
- » •Government Role to Promote Adaptation by Market Creation
 - Transferable Development Rights (TDRs)
- » •Ecosystem Services



Source: Margaret Caldwell, Stanford Law

Planning for Climate Change

“Preparedness is Adaptation”

- Risk Management Framing: **no or low cost actions**
- Adaptation may increase resilience to risks
- One tool: developing and evaluating **scenarios**
- Goal: avoid greater future costs - examples:
 - “Build with the Future in Mind”: better urban design & planning without necessarily greater costs
 - Plan to relocate key facilities if needed because of climate change impacts - like sea level rise
 - Contingency Contracts: arrange to spend funding in advance of disasters
 - Insurance & Finance: adapt=lower premiums & loan rates
- **Timing of public policy action is key!**
- **Key Barrier: Issue of short-term benefit vs. long-term liability...**

NEW FRAMING for ADAPTIVE BEHAVIOR

BENEFITS VS. COSTS OF INACTION

INCENTIVIZE via SUSTAINABILITY

“PROSPERITY SECTOR”: “Live Local and Prosper”

- developers, financiers, insurers, planners, real estate, builders, lawyers (linked to water, transportation, emergency preparedness, public works, public health managers, elected leaders)

Issues—available levers of influence:

- planning, urban design, insurance, finance, taxes, tourism, building and zoning codes, regulation, property values, green infrastructure and buildings, smart-growth, and density

States & Universities could provide technical capacity to locals on adaptation via “Climate Extension”:

- a need to bring together sectors that have a role in climate adaptation but may be involved yet